

WO 02/09777

PCT/FR01/02506

Method for bactericidal, fungicidal, virucidal and insecticidal treatment of ambient air

Technical field of the invention

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The field of the invention is air treatment, and the invention relates to a method for applying a bactericidal, fungicidal, virucidal and insecticidal treatment of ambient air, and also to a device for 10 implementing this method and to the uses made thereof.

State of the art

Various methods of physicochemical treatment of ambient 15 air are known. In general, the air is drawn through a permeable container in which is placed at least one treating agent. For example, if the air treatment is a mechanical treatment aimed at removing therefrom dust in suspension, the treating agent is a filter 20 consisting of a microperforated sheet, made of cellular or synthetic material, or of a layer of alveolate material. For example again, if the air treatment is a chemical treatment, the treating agent consists of an active agent, such as a charcoal-based agent, in order 25 to modify the chemical composition of the air and/or to absorb toxic gases therefrom. For example, finally, if the air treatment is a physicochemical treatment, the treating agent is a source of radiation, in particular of ultraviolet radiation. It will be understood that 30 the air may be drawn through several successive treating agents of respective nature, the containers being, for example, juxtaposed inside a common receptacle comprising an inlet for air to be treated and an outlet for treated air.

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Document SU 19904786074 relates to a device for the filtering and bactericidal treatment of ambient air using crystals of sodium chloride, NaCl, and of

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potassium chloride, KCl. The air is then refiltered before being sterilized by radiation using a lamp.

5 The problem which remains to be solved in these known devices is the risk of contamination of the container in response to the mechanical filtering effect.

Subject of the invention

10 The aim of the present invention is to provide a method for treatment of ambient air, and for decontamination of the container, and also means for the implementation thereof within a context of domestic applications.

15 The method according to the present invention consists in using a treating agent which has bactericidal, fungicidal, virucidal and insecticidal effects, in addition to mechanical filtration, and in distributing the treating agent uniformly inside the container, so 20 as to prevent the development of microorganisms on the container itself.

More particularly, the treating agent is composed of 25 crystals of mineral salt, in particular sodium chloride (NaCl).

The treating agent may also contain elements of natural origin, in particular of plant origin, such as clove.

30 It will also be noted that the mineral salt crystals may advantageously be mixed with other treating agents, preferably of natural origin.

35 The invention also relates to a device for treating ambient air, comprising two microperforated sheets for mechanically filtering the air and a layer of bactericidal, fungicidal, virucidal and insecticidal treating agent which is distributed uniformly between said sheets so as to prevent the development of

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microorganisms on the walls. By virtue of this set up, the ambient air is not only treated mechanically so as to remove therefrom the particles in suspension, and biologically so as to freshen it, but is also used to 5 carry natural substances which are beneficial to people's health, mineral salts and, secondarily, substances of plant origin in particular.

It will be understood that the container of the mineral 10 salt crystals of the invention can, where appropriate, be juxtaposed, along the direction in which the air is drawn, or circulated, with at least one other container which contains a treating agent of another nature, in particular mechanical and/or physicochemical, so as to 15 form an overall device for treatment of ambient air.

The method of circulating the ambient air through the salt crystals, and also the design of the container, [lacuna] unimportant as far as the scope of the 20 invention goes and are linked to the specific use made thereof.

Thus, and according to various variants of the method 25 of circulating the air through the salt crystals, it is drawn artificially or naturally.

According to a first variant, the circulation of air is caused artificially by ventilation. This variant in particular falls within the context of a first group of 30 applications of the invention to calorie-exchanging devices, such as heating or refrigerating devices, air conditioners, or air-recycling appliances.

According to a second variant, the circulation of air 35 is caused naturally, by evaporation of gas or by pressure variation for example. This variant in particular falls within the context of a second group of applications of the invention to purifying air coming from a fermentation environment, and more

particularly to organic waste containers.

Thus again, and according to various variants of the container, in particular corresponding to the various
5 abovementioned methods for circulating the air through the salt crystals, these crystals may be contained inside a permeable case maintained on a support, or be contained in a flexible net closed up on itself to form a sack or be contained between the walls of a double-
10 walled flexible container.

According to a first variant of the container, which in particular corresponds to the first group of
15 abovementioned applications, the case, or alternately the net, is either interchangeable or organized so as to allow the crystals to be replaced. Moreover, the case, or alternately the net, is, where appropriate, placed inside a receptacle comprising an inlet for air to be treated and an outlet for treated air. It will be
20 understood that the container, case or alternately net, is, if need be, juxtaposed with at least one similar container of a mechanical, chemical or physicochemical treating agent of the various types mentioned above.

25 According to a second variant of the container, corresponding to the second group of abovementioned applications, the double-walled container is, for example, closed up on itself so as to also form a sack intended to contain waste, in particular household
30 waste. For example again, the double-walled container is arranged as a sheet for covering a fermentable material, for a landfill pit or transformation container for organic waste in particular.

35 **Summarized description of the drawings**

The present invention will be more clearly understood, and details which are a product thereof will become apparent, in the description which will be made up of

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preferred embodiments and types of application thereof, in relation to the figures on the attached plates, in which:

5 fig. 1 to fig. 3 are diagrammatical representations of various respective embodiments of a device for treatment of ambient air, which implements a method of the invention,

10 fig. 4 is a diagrammatical representation of a device for treatment of ambient air according to a particular type of application of a method of the invention, which uses various treating agents of respective nature,

15 fig. 5 to fig. 9 are diagrams illustrating various examples of applications of the method for treatment of ambient air provided by the invention.

20 On fig. 1 to fig. 3, a device for bactericidal, fungicidal and/or insecticidal treatment of ambient air uses a treating agent 2 based on mineral salt crystals. In the various examples of the preparation illustrated, the crystals 2 are uniformly distributed inside a permeable container, such as 4 or 6, so as to prevent 25 the development of microorganisms on the container itself.

Description of preferential embodiments

30 On fig. 1 and fig. 2, the container 4 consists of two microperforated sheets 8, 8' of synthetic or natural origin, supported by a frame 10. It will be noted that the frame 10 preferably comprises an opening, not represented on the figures, which makes it possible to 35 introduce the salt crystals between the two sheets 8, 8', or even to replace them after prolonged use. This set up is such that the container 4 is arranged in the form of a cassette of treating product 2, which can be supported by a receptacle in such a way that it can be

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removed, with a view to it being interchangeable.

It will be noted on fig. 1, that the container 4 receives only salt crystals 2, whereas, on figs. 2, the 5 container 4 receives a layer of salt crystals 2 and a layer of treating agent of plant origin 12. According to an embodiment not represented on the figures, the salt crystals 2 and the treating agents of plant origin 12 are mixed.

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Referring more particularly to fig. 4, a device for overall treatment of air comprises a receptacle 14 with several compartments, which each house, in a removable manner, a container 4 of a treating agent of respective 15 nature and/or origin.

Such a device preferably comprises at least any one of the following successive treating agents:

- a layer of foam 16, such as natural or synthetic 20 cotton wool, for a first crude, mechanical filtration of the polluted air 1,
- a layer of mineral salt crystals 2 for bactericidal, virucidal and/or fungicidal treatment of the air,
- a fine mechanical filter 18, such as a filter made of 25 paper or of fabric,
- a layer of specific fragmented plants 12, such as thyme and/or cloves, to supplement the bactericidal and/or fungicidal and/or insecticidal action of the mineral salt crystals 2, and/or to diffuse a 30 fragrance into the ambient air treated, and/or to provide an effect which is beneficial to people's health, concomitantly with the medicinal effects provided by the mineral salts 2,
- a fine mechanical filter 18 of the abovementioned 35 type,
- a compartment 22 for treatment of air by radiation, such as by ultraviolet rays 24 and/or by magnetic waves 25 and/or by sound waves, for germicidal treatment of the air,

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- a fine mechanical filter 18 of the abovementioned type,
- a layer of active charcoal 26 and/or of natural wool, and/or of rare-earth metals, in order, optionally, to

5 absorb toxic gases.

It will be understood that the various treating agents 16, 2, 12 and 26 are housed in respective containers which are similar, with a view to them being

10 interchangeable or being removed depending on the air treatment(s) desired by the user.

On fig. 3, the container 6 consists of a double-wall, 28 and 30, microperforated flexible sheet for the purpose, for example of making a sack for household waste 32, such as that illustrated in fig. 9.

On fig. 5 to fig. 8, a device using the method of the invention also comprises means 34 for circulating the air to be treated through at least one treating agent by ventilation, and more particularly through at least 20 one agent based on salt crystals 2.

On fig. 5, the method of the invention is applied to a child's pram 36. Similar applications will be noted, such as the passenger compartment of a vehicle or a safety hat.

On figs. 6 and 7, the method of the invention is applied to calorie-exchanging appliances or installations which comprise an air ventilation circuit 38, such as air conditioners, radiators or refrigerators (fig. 6), or air-recycling installations or appliances (fig. 7). It will be noted that, 30 according to this last application, the device may comprise not only an inlet for polluted air 1, but also a secondary inlet for outside air 5.

On fig. 8, the method of the invention is applied to

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freshening closed environments, in particular shoe cupboards 40, cold rooms, refrigerating appliances, baby implements, etc.

- 5 An application of the invention, not represented in the figures, will also be found in the construction field, the invention being applied to elements for coating a surface, such as a floor, wall or ceiling, so as to limit the development of bacteria or fungi. According
- 10 to this application, the container of salt crystals is, for example, arranged in the form of a double-walled panel or film.